Comments on:

ENVIRONMENTAL TOBACCO SMOKE: A GUIDE TO WORKPLACE SMOKING POLICIES

[Draft] EPA/400/6-90/004

Response Addressing:

Chapter 2: Measuring ETS in the Air and Body

Section: Assessing ETS Exposure

Section: Air Monitoring Studies

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SUMMARY

Chapter 2: Measuring ETS in the Air and Body, ASSESSING ETS EXPOSURE, Air Monitoring Studies provides a distorted, incomplete, and naive view of the stated subject. This section of the Guide, in its present form, guarantees that users will make uninformed and subjective decisions regarding smoking policies. The inaccuracies, limited number of supporting literature, and imprecise word usage indicate either egregiously poor scholarship or a deliberate attempt to misinform. The EPA has failed entirely in the section on **Air Monitoring Studies** to provide a single, representative example of average RSP concentrations in workplaces where smoking is permitted. By using the National Ambient Air Quality Standard (NAAQS) for particulate matter as a point of reference for indoor levels of ETS, the EPA: (a) misinforms the public regarding the intent of the NAAQS and their regulation, and (b) disregards the regulatory process which they are legally required to observe.

Specific comments are provided below.

ITEM 1. After discussing briefly four ways to assess ETS exposure (namely, monitoring the air, measuring biological markers, administering questionnaires, and applying mathematical models), the Guide states at p. 12:

> Since 1981, approximately 50 studies have been done of ETS concentrations in buildings. Using these methods, researchers have found that [a] **ETS diffuses rapidly through buildings, [b] persists for long periods after smoking ends, and [c] represents one of the major sources of indoor particulate pollution.**

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COMMENTS

1. **Incomplete review** The paragraph lacks completeness. Air monitoring studies were done before 1981. Indeed, a sufficiently large number of studies existed in 1982 to justify review by Sterling *et al.* [1]. This reviewer recommends that the EPA perform a more thorough review of the literature relating to "air monitoring" for ETS. This reviewer also questions whether 1981 holds any special significance. If this year is important, the EPA should explain why.

2. **Absence of adequate literature citations** The Guide needs literature citations for the "approximately 50 studies" that have been done. This sentence suggests that a fairly large body of information exists on the assessment of exposure to and the physical behavior of ETS. In addition, the sentence suggests that this information presents a consistent picture of the three findings the paragraph summarizes. To this reviewer's knowledge, the literature does *not* provide a picture *consistent* with these findings nor does it generally *support* these findings.

3. **Failure to follow logical process** The EPA also implicitly fails to follow the logical process required to support this paragraph in particular and the contents of the Guide in general. Thus, in attempting to interpret the significance of the reference to 50 studies, this reviewer must question the EPA's technical basis for the Guide. The EPA is an agency bound by scientific and technical principles including observance of the logical framework that the stated findings imply. The logical development of this Guide requires that the EPA first complete the technical and scientific analyses of the issue to support policy. The Technical Compendium drafted earlier by the EPA theoretically could have provided this support. However, because of many technical deficiencies, the draft Compendium fails to achieve this end. Consequently, this reviewer concludes that the EPA has failed to

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provide the public with the support for the policy pronounced by the Guide. In simple terms, the absence of adequate support for the Guide shows that the EPA is either putting the cart before the horse or intends to omit the horse altogether. Clearly, it is essential that the EPA prepare a scientifically sound, peer-reviewed technical document to support the Guide.

4. **Implications regarding what the studies measured** The first sentence is misleading because it suggests that the "50 studies" *measured* "ETS concentrations." Because no ideal indicator (or marker or surrogate) for ETS exists, it is incorrect to say that ETS concentrations are measured. Furthermore, because ETS comprises two phases (a particulate phase and a gas phase), *estimating* "ETS concentrations" at a minimum requires measuring two indicators: One for the vapor phase, the other for the particulate phase. Most studies reported in the literature measured a single surrogate of ETS exposure, therefore restricting exposure assessment to only one ETS phase. Few studies (substantially less than 50) have included more than one surrogate that, in principle, could allow estimates of exposure to both phases.

5. **Implications on the quality of the studies** Without literature citations for the "50 studies," this reviewer, and for that matter, the potential users of this Guide, are left to assume that the quality of each of the 50 studies is adequate to support their collective mention. This assumption is highly questionable, and probably false. The literature on ETS measurements shows that studies vary widely in terms of quality. Indeed, the literature documents discredited studies; e.g., Green *et al.* [2] discredited the work reported by Williams *et al.* [3], *which the Guide itself cites.* (See p.70: 73. WILLIAMS, DC., WHITTAKER, JR., JENNINGS, WG. Measurement of nicotine in building air as an indicator of environmental tobacco smoke levels, Environmental Health Perspectives, Volume 60, p. 405-410, 1985.) Inasmuch as one such discredited study is cited in the Guide to support the EPA's position, this

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reviewer must question the quality of the "50 studies" which the EPA uses to support the three findings.

6. **Implied meaning of the word "study"** Used in conjunction with the word "study," the phrase "using these methods" is vague and therefore misleading because it implies that the "50 studies" mentioned earlier include those where mathematical models, biological monitoring, and questionnaires were employed. Mathematical modeling of ETS exposure has *not* been validated. An error analysis derived from information presented by the National Research Council [4] demonstrates that some models reported in the literature cannot provide reliable predictions of ETS exposure (see review by Drs. Sears and Cole included in the Company's response). In addition, this reviewer is unaware of any study where questionnaires were employed that pertained to any of the three findings (identified as a, b, and c under **Item 1.**) Indeed, this reviewer fails to see how questionnaires could be employed scientifically to address any of the three findings.

7. **Implied pertinence of buildings studied** Without citations for the "50 studies," the user of the Guide is has to assume that the buildings studied are pertinent to the needs and interests of "government and private sector decision makers," the intended users of the Guide. This probably would be an incorrect assumption. Given that the Guide relies heavily on citations relating to studies of private residences (see the paragraphs below in the section titled **Air Monitoring Studies**), this reviewer questions the general pertinence of the "50 studies" mentioned. Clearly, the Guide would serve the needs of its intended users better by discussing studies carried out in workplaces.

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ITEM 2. The Guide states on p. 12 under **Air Monitoring Studies:**

> "However, studies show that where smoking is permitted, ETS is the major contributor to RSP in indoor air.[27]"

COMMENTS

1. **General** This statement is false. Additionally, semantic carelessness leads to the reasonable conclusion that the intent of the sentence is to misinform.

2. **Inappropriateness of the word "studies"** The word "studies" does not agree in number with the literature citation, which describes a *singular* study. Clearly, this sentence, which makes a very strong point, demands a commensurately strong citation of the supporting literature.

3. **ETS not "the major contributor"** The results presented and cited (SPENGLER, JD., DOCKERY, DW., TURNER, WA., WOLFSON, JM., FERRIS, BG, Jr. Long-term measurements of respirable sulfates and particles inside and outside homes. Atmospheric Environment 15(1): 23-30, 1981) [5] do not support the finding that "ETS is *the major contributor* to RSP in indoor air." For example, Table 2 in that publication shows a mean indoor RSP concentration of 24.4 $\mu g/m^3$ for 35 homes with no smokers. The mean concentration shown for 15 homes with one smoker is 36.5 $\mu g/m^3$. If one assumes that RSP from ETS accounts for the difference between the two results, then ETS contributes 12.1 $\mu g/m^3$ to the total RSP, 36.5$\mu g/m^3$, in the homes with one smoker. This contribution represents 33.2% of the total. "The major contributor?" No, hardly. This reviewer recommends that the authors revise this sentence to be accurate.

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4. **Insufficient data to support policy** This reviewer concludes that the study by Spengler *et al.* [5] contains insufficient data to support generalization about the contribution of ETS to RSP levels in homes. Thus, the study reports results from measurements of 55 homes located in six cities. Of these, 35 were identified with no smokers, 15, with one smoker, and 5, with "2+" smokers.

5. **Pertinence of homes to users** As mentioned above (**ITEM 1., COMMENT 7.**), measurements of ETS exposures in homes is not pertinent to those places, e.g., workplaces, which would affect the users of the Guide.

6. **Inappropriate use of the word "permitted"** In the sentence, use of the word "permitted" is inaccurate, inappropriate, and misleading. This reviewer is led to question the authors' motives. Users of the Guide could interpret this sentence to mean that studies were conducted in public places because permission to smoke would be an issue there. Few users would review the footnotes to learn the title of the paper cited; fewer still would read the paper itself. Why is it then that the authors used the phrase "where smoking is permitted" rather than, for example, the phrase "in homes where smoking occurred"?

ITEM 3. The Guide states in several places that:

> ETS diffuses rapidly through buildings.

[See p.3, Measuring ETS in the Air and Body; p. 12 under ASSESSING ETS EXPOSURE; and p.22 under CHAPTER 5: Reducing Exposures to ETS.]

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COMMENTS

1. **Misuse of the term diffusion** This reviewer assumes that the EPA means dispersion rather than diffusion. Diffusion relates to motion associated with molecular properties of matter. Diffusion of RSP is therefore necessarily slow. The EPA should use the term "dispersion" to be technically accurate.

2. **Failure to address the effects of dilution** Assuming a value for "rapid," one can argue the truth of this statement based upon fundamental principles of physical chemistry. However, such an argument would address only *part* of the truth. Through omission, the statement misrepresents the science relating to ETS exposure and is therefore misleading. Put simply, *rapid dispersion* must be accompanied by great and equally *rapid dilution.* Experimental support for the relation between dispersion and dilution comes from a comparison of measurements of ETS indicators in smoke plumes with measurements of the same indicators in field settings. Although experiments verify the relation between dispersion and dilution, experimental support for the rapid dispersion of ETS through buildings is meager and ambiguous with respect to implications for ETS exposure. The literature contains very few studies where air monitoring was employed to investigate the matter of the rapid ETS dispersion in buildings. Reported studies involving mathematical modeling assume *a priori* the untested postulate that dispersion is rapid, and are therefore logically inappropriate for addressing the issue. The fundamental problem, however, is that none of the air monitoring studies reported in the literature employed indicators of ETS exposure that were capable of providing unambiguous results regarding dispersion of ETS. Studies that monitor either RSP or CO as indicators are incapable of adequately accounting for non ETS sources. Studies that monitor the air for nicotine or that measure biological markers (and only cotinine, a nicotine metabolite, is viable) indicate nicotine vapor exposure only and not exposure

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to the particulate phase of ETS. For example, Nelson *et al.* [6] have shown from field studies the presence of residual nicotine in the absence of ETS RSP.

The matter of dilution raises a related question: What is the ***de minimis*** level of an indicated ETS exposure? Is it the EPA's policy that any measurable amount of an ETS indicator is evidence of biologically significant exposure? These are both critical questions. With enough effort, scientists can find those stray molecules of ETS indicators that originate, for example, from the clothes and bodies of smokers who occupy environments, yet do not smoke there. What would the EPA's position be if, for example, nicotine was detected in the ambient air in a park or on a street corner?

ITEM 4. The Guide states in several places:

[ETS] persists for long periods after smoking ends.

(For example, see p. 3 under **Key Points** and p. 12 under **ASSESSING ETS EXPOSURE.**)

COMMENT

1. **Failure to address dilution** The issue of persistence is closely linked to the issue of the rapid "diffusion" of ETS commented upon above. Major questions in this regard include:

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(a) How long does ETS persist in buildings? The EPA is obligated to provide some quantification of this point.

(b) What literature supports this finding and why does the Guide not cite such necessary supporting literature? Again, it is incumbent upon the EPA to provide supporting literature.

ITEM 5. The Guide states at p.12 under **Air Monitoring Studies:**

However, neither type of monitor measures all the components of ETS because the number of constituents is too large.

COMMENT

1. **Failure to adequately identify limiting factors** This statement is incomplete and inaccurate because it implies that monitoring is limited only by the large number of ETS constituents. The more important limiting factors include:

   (a) the unavailability of sufficiently validated methods for determining constituents in ETS collected from representative situations;

   (b) sampling constraints, for example, detection of most constituents requires sampling exceedingly large volumes of air, which is impractical; and

   (c) most ETS constituent concentrations (*which are postulated to exist based upon their identification in mainstream and sidestream smoke*) are below the limits of detection for those relatively few cases where methods are available.

To be complete the EPA must address these factors.

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ITEM 6. Following the above sentence, the Guide states:

> Instead, **surrogates** are used, chemicals that are accurate indicators of the presence and quantity of ETS. The most commonly used surrogate is respirable suspended particles (RSP).

COMMENTS

1. **Failure to address adequately the limitations of surrogates** Both these sentences are inaccurate. Currently, the scientific community lacks an adequate understanding of the reliability of *all* the ETS surrogates (or indicators) employed. The accuracy of RSP and nicotine (and therefore by extension, cotinine in body fluids) as surrogates for ETS exposure is the focus of current (and as yet, incomplete) research. Scientists know that RSP is not an *accurate* indicator of exposure to ETS because it lacks specificity. For example, studies of offices and restaurants where RSP is apportioned for ETS show that RSP measurements by themselves overestimate average ETS exposure by roughly 200% [7]. Thus, stating that RSP is the most commonly used surrogate of ETS is misleading because it implies that it must be reliable because it is commonly used. This logic is false.

2. **RSP not most commonly used surrogate** Moreover, complete review of the literature demonstrates that RSP is not the most commonly used surrogate of ETS exposure. Clearly, the EPA's statement shows that the EPA has neglected a sizable portion of the literature. Such neglect strongly suggests that the EPA is arbitrary in its review of the literature.

3. **Nicotine most commonly used surrogate** Nicotine, rather than RSP, is the most commonly used indicator of exposure to ETS. This reflects its specificity for ETS, its general presence at measurable levels in indoor air, and the

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availability of validated methods for its measurement. Nicotine, however, is deficient because it indicates exposure to the vapor phase of ETS. Thus, a complementary indicator, specifically for exposure to the particulate phase, is required to draw conclusions regarding exposure to ETS. Ultraviolet particulate matter (UVPM) [8], the most commonly used indicator of the particulate phase of ETS, fills this need. The EPA has neglected entirely the literature where UVPM has been employed as an ETS indicator. (See, for example, [7, 9, 10, 11, 12, 13].) It is the EPA's responsibility to ensure that the literature is adequately presented; the EPA has failed to do so.

4. **RSP not a chemical** Finally, RSP is not a chemical; it is a physical description of matter. The EPA has failed to provide an accurate rendering of a basic scientific principle relating to the physical properties of ETS.

ITEM 7. The Guide states at p. 12 under **Air Monitoring Studies:**

> RSP refers to tiny particles, small enough to be inhaled deeply into the lungs, that are present in all air.

COMMENT

1. **Failure to address particle deposition.** This sentence presents part of the technical picture and thus is apt to misinform the users of the Guide, who can reasonably assume that RSP thus inhaled is deposited deeply and completely in the lungs. Rather, particle deposition is quite limited: according to the National Research Council [4], approximately 10% of RSP is deposited. In addition, this sentence does not adequately distinguish between exposure and dose. The EPA should provide a complete review of the issues relating to exposure and dose relative to RSP from ETS.

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ITEM 8. The Guide states on p. 12 under **Air Monitoring Studies:**

> Stationary air monitor studies have compared RSP levels in the homes of smokers and nonsmokers. They found that each smoker generates 25 to 35 micrograms of RSP per cubic meter of air ($\mu g/m^3$). Homes with two or more heavy smokers frequently exceed the federal 24-hour outdoor particle standard of 260 $\mu g/m^3$. In homes with heavy smokers, short-term particulate concentrations of 500 to 1,000 $\mu g/m^3$ are not uncommon.[28]

COMMENTS

1. **Pertinence** As discussed above (**ITEM 1, COMMENT 7; ITEM 2, COMMENT 5**), homes are not pertinent to the users of the Guide. The comments above hold.

2. **Ambiguous citation** The location of literature citation number 28 is ambiguous. Does this citation refer to the entire paragraph or a part of it?

3. **Inadequate technical support for data** The sentence is vague in regard to the range of RSP generated by a smoker. For example, what is the averaging time for this result? Also, what is the uncertainty associated with this range? These are important questions for the users of the Guide and the EPA should provide answers.

4. **Inappropriate use of the word "generated"** The study supplying the range of RSP "generated" by a smoker did not measure RSP generation; rather, the range came from a comparison of RSP in smokers' and nonsmokers' homes. Thus, strictly speaking the phrase should read each smoker was *associated* with

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an increase of 25 to 35 $\mu g/m^3$ RSP relative to homes of nonsmokers. The EPA should revise accordingly.

5. **Failure to provide adequate reference levels of RSP** The paragraph lacks perspective and is therefore misleading. The EPA fails to present data on the levels of RSP in nonsmokers' homes.

6. **Representativeness of smoke generation values** The paragraph is misleading because it implies that smoke generation as estimated in the home environment is representative of smoke generation in the environments (i.e., workplaces) of interest to users of the Guide. Based upon differences in ventilation rates between the two general environmental categories (namely, homes and public places), one must conclude that such representativeness is lacking. If the EPA uses this example of smoke generation for homes, it must provide the rationale for the applicability of such information to public places.

7. **"Heavy smoker" undefined** The Guide is ambiguous in its use of the term "heavy smoker." Without some quantification of this term, the users of the document are left to speculate (perhaps subjectively) on the extent smokers might affect air quality.

8. **Representativeness of situations with multiple smokers** Addressing the matter of homes occupied by two or more smokers, raises a related issue. In those environments of interest to the users of the Guide, to what extent are situations encountered where rooms are occupied by more than one smoker? Simple demographics argue that these situations would occur rather infrequently, a situation which calls into question the pertinence of the issue of two or more smokers in home environments. For those environments of interest to the users of the Guide, it is also probable that for those few cases where more than one smoker occupies a room there exists an equal and

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diminishing probability that nonsmokers will be present. The EPA should provide the users of the Guide information regarding the prevalence of conditions in public places where nonsmokers find themselves in rooms occupied by two or more smokers.

9. **Inapplicability of NAAQS** The federal 24-hour outdoor standard is inapplicable when discussing indoor exposures to RSP. *By offering this standard as a point of reference, the EPA (a) misinforms the public regarding the intent of such standards and their regulation and (b) disregards the regulatory process which they are legally required to observe.* Thus, users of the Guide may naively assume that the proper regulatory process has been followed. A proper regulatory process must include preparation of criteria documents, development of standards from measurements made in all indoor environments, and application of Reference Methods for assessing whether an exceedance occurred. (But assuming home measurements are relevant to the issue, then the other side of the issue is: to what extent is the federal 24-hour standard exceeded in homes of nonsmokers?)

10. **Implications of exceedances** The sentence dealing with the issue of exceeding the 24-hour standard implies that levels below 260 $\mu g/m^3$ are acceptable inasmuch as they do not exceed the standard. Is this the EPA's intent?

11. **Failure to identify averaging times and probabilities** The sentence "In homes with heavy smokers, short-term particulate concentrations of 500 to 1,000 $\mu g/m^3$ are not uncommon" is vague and misleading. Without some quantification of both the averaging time for these measurements and the probability of "not uncommon," the reader must speculate regarding the implications of this statement. In addition, presenting such information without explaining that environmental data are generally log normally distributed will lead most uninformed readers to assume that average levels

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lie somewhere near the midpoints of the implied range, namely, from 250 to 500 $\mu g/m^3$, an assumption which is false.

ITEM 9. The Guide states on p. 12 under **Air Monitoring Studies:**

> Studies of public buildings duplicate these findings.

COMMENT

1. **Lack of support for "duplication"** This sentence, because of the vague meaning of the phrase "*these* findings," does not and cannot communicate effectively. Additionally, the sentence contains inaccuracies. For example, to this reviewer's knowledge, the literature does *not* support the position that the finding regarding the contribution of smokers to RSP levels presented in connection with homes is duplicated in public buildings. The EPA should provide explicit support for this point, if indeed such support exists. The comments made in connection with the preceding paragraph (under **ITEM 8**) also apply (with the exception of the issue of pertinence) in view of the stated position that results from studies in public places are duplicated by results from studies done in homes.

ITEM 10. The Guide states on p. 12 under **Air Monitoring Studies:**

> Levels [of RSP] in non-smoking buildings, such as churches, libraries and museums, had low levels of RSP. By contrast, restaurants, bars and bus stations, where smoking was permitted, had RSP levels ten to twenty times as high.[29,30]

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COMMENTS

1. **Pertinence** The selection of churches, libraries, and museums for purposes of comparing RSP levels is inappropriate for the users of the Guide. These environments are places where smoking either does not occur because of custom or where smoking is generally prohibited because of fire safety or preservation concerns. The users of the Guide are highly unlikely to find themselves having to make decisions regarding smoking policies in these environmental categories.

2. **Ineffective communication** Unquantified use of the word "low" in connection with the levels of RSP in churches, libraries and museums is vague. A similar argument applies to the phrase "levels of RSP in restaurants, bars and bus stations ... had RSP levels ten to twenty times as high." The EPA should provide values for the levels of RSP measured.

3. **Inappropriate and inaccessible literature citation** Literature citation number 29 is inappropriate for this document [MIESNER, EA. et al. Report to the U.S. Environmental Protection Agency, Cooperative Agreement No. CR 813526-01-0, Harvard School of Public Health, 1988]. This paper is essentially inaccessible to the users of the Guide as well as to this reviewer. This reviewer, in addition, questions whether this paper has been peer-reviewed. Moreover, the EPA library in the Research Triangle Park, NC was unable to locate this paper. Thus, because the Guide fails to provide a complete bibliography, thorough review is not possible.

Nevertheless, this reviewer does have available two reports by Miesner *et al.* which have subject areas relevant to the Guide: Miesner, E.A. *et al.* [14]; and Miesner, E.A. *et al.* [15]. In addition, both reports identify the same Cooperative Agreement number. If these are substantively the same as that

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cited in reference number 29, the EPA should cite one or both of these instead, because they are generally accessible to the users. Finally, this reviewer will assume that these two papers by Miesner *et al.* [14, 15] are substantively the same for purposes of reviewing the Guide.

4. **Inappropriate and biased choice of environments for comparison** The EPA has selected environmental categories which represent two extremes of RSP concentrations which exist in field settings, and has compared RSP levels for these categories on a relative basis. This reviewer seriously questions the EPA's objectivity in offering this comparison because it violates simple logic and scientific principles, and because it too strongly resembles advertising hyperbole. If a comparison is to be made, objectivity demands that an absolute reference value, e.g, an RSP concentration, be provided. The EPA has failed to provide such a reference concentration. Indeed, the identities and contributions of non ETS sources of RSP will differ substantially among such environmental categories and, as stated before, RSP is not specific for ETS; thus, gross errors will be introduced if consistent environmental categories are not compared. The choice of environmental categories for the comparison is a variation on the elementary theme of "apples and oranges." Clearly, if the EPA is to make such comparisons, logical principles demand that comparisons be made in terms of consistent environmental categories; e.g., RSP in offices where smoking is not permitted relative to offices where smoking is permitted.

5. **Quality of Reference Number 30** The quality of the work described by reference number 30 is poor. The reference fails to address quality assurance relative to the calibration of the device used to monitor RSP. The device used is subject to substantial bias (overestimating levels of RSP) if not calibrated against ETS. Furthermore, corrections for ambient contributions of RSP were not applied consistently across environmental categories. Finally,

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averaging times varied by an order of magnitude for the measurements made. Thus, comparisons based upon this reference are invalid.

ITEM 11. The Guide states on p. 12 under **Air Monitoring Studies:**

> The highest RSP levels were found in designated smoking areas, where the level of RSP correlated with the number of cigarettes smoked.

COMMENTS

1. **Undefined environmental category** The EPA does not make clear where the RSP concentrations occurred. The sentence implies that measurements were made in restaurants, bars and bus stations. The EPA should identify the environmental category for the user. Based upon the assumption stated above and the absence of measurements of such areas reported by reference number 30, this reviewer suspects that the environmental categories include one office and one clinic. If this assumption is correct, then the sentence also is misleading. Thus, the data in Table III of the report by Miesner *et al.* [15] do not support the position that the highest RSP levels were found in designated smoking areas. That paper contains the following sentence: "The two highest concentrations for all three instruments were in the designated smoking rooms of non-smoking buildings." This reviewer is left to assume that the two highest concentrations measured are different from the two highest concentrations reported. If all these assumptions are correct, then the EPA has failed to account adequately for the averaging time factor in summarizing and comparing results. To communicate adequately, to be consistent, and to provide valid comparisons, the EPA must address the comments above. Furthermore, this reviewer seriously questions the representativeness of two results for providing an adequate picture for the users of this Guide for

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purposes of understanding levels of RSP in smoking areas in general. Thus, if the objectives of this Guide are to be met, results from a survey of RSP levels in designated smoking areas are necessary.

2. **Unquantified RSP level** The phrase "highest RSP levels" does not communicate effectively because the RSP level is unquantified. The EPA should provide the reader with a value.

3. **Pertinence** This reviewer questions the pertinence of discussing RSP levels in designated smoking areas to the users of the Guide. One would reasonably assume that the exposure of nonsmokers to ETS would not be an issue here, because such exposure would be voluntary. Similarly, smokers would voluntarily choose to occupy such areas. Furthermore, smokers' exposure to ETS in designated smoking areas is insignificant relative to mainstream smoke exposure. Additionally, even the Guide offers as a mitigation strategy the designation of smoking areas. This reviewer recommends that the EPA state explicitly the pertinence of RSP levels in designated smoking areas to the needs of the users of the Guide.

4. **Undefined designated smoking area environment** If the EPA is citing a limited number of examples of RSP concentrations in designated smoking areas, then the Agency must clearly define the environmental conditions. Without this information, the users of the Guide cannot adequately interpret the results. The following information is needed: Average number of smokers, smoking rate (e.g, the number of lit cigarettes per number of occupants), room volume, ventilation rate (for example, in units of air changes per hour), and the averaging time for the measurement.

5. **Implications regarding modeling** The item about the correlation between RSP and number of cigarettes smoked is revealing because it represents a tacit

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admission regarding the limited applicability of models used to predict exposure to ETS RSP. Put simply, models provide reasonable correlations only under conditions where ETS levels are extraordinarily high relative to those exposures encountered by nonsmokers.

ITEM 12 The Guide states on p. 12 under **Air Monitoring Studies:**

> One office building had RSP levels of 11 $\mu g/m^3$ in its nonsmoking offices, and 520 $\mu g/m^3$ in a smoking lounge.

COMMENTS

1. **Failure to identify representative, pertinent, average RSP levels in areas where smoking is permitted** Yes, no doubt one could measure RSP in an office building and obtain such values; however, the important matter for the users of the Guide is the average levels of RSP encountered in offices and other public places where smoking is *permitted* as distinguished from *designated*. This reviewer is seriously concerned about the absence of such needed information in the Guide *in general* and is unable to understand why **the EPA has failed entirely in the section on Air Monitoring Studies to provide a single, representative example of an average RSP level in a place where smoking is permitted that is pertinent to the needs of the intended users.** Lacking such information on average RSP levels, a reasonable person can conclude that the Guide is a propaganda vehicle, which clearly should not be the intent of the U.S. EPA. The EPA must provide the users of the Guide with this information.

2. **Unusually low concentration of RSP in nonsmoking area** The concentration, 11 $\mu g/m^3$, is unusually low even for a nonsmoking area. The

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representativeness of this value is open to speculation. It is highly probable that many users of the Guide will interpret this value as the expected average RSP concentration in nonsmoking offices. To inform the users of the Guide adequately, the EPA must provide average RSP concentrations expected in nonsmoking offices.

3. **Policy by anecdote** This sentence presents results from a *single* pair of data. An informed scientist could not support the position that these two data from a single set of measurements could adequately represent RSP levels in nonsmoking *versus* designated smoking areas. Because this sentence relies on so few data, it can be described as scientific anecdote. ***Anecdote, even if scientific, cannot support policy, which is the purpose of the Guide.*** If this sentence is to remain, the EPA must provide scientific support. This comment applies equally well to many similar examples in the **Air Monitoring Studies** section.

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ITEM 13. The Guide states on p. 12 under **Air Monitoring Studies:**

> In the smoking section of an airplane, RSP levels were five times higher than in the nonsmoking section, reaching 1,000 $\mu g/m^3$.[32]

COMMENTS

1. **Ad absurdum argumentation and failure to provide adequate literature support** The U.S. Department of Transportation performed the most comprehensive study of air quality in passenger cabins of commercial aircraft to date [16]. This study reported many RSP concentrations in nonsmoking sections to below the limit of detection. With the logic employed above, the conclusion can be drawn that RSP levels in smoking sections of aircraft were ∞ times greater than those in nonsmoking sections.

2. **Policy by anecdote** This sentence provides the best example of this in the section. Again, only one reference is cited to support the claim.

ITEM 14. The Guide states at p. 12 under **Air Monitoring Studies:**

> Personal air monitor studies found similar results.

COMMENT

1. **See ITEM 9.**

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ITEM 15. The Guide states at pp. 12 to 13 under **Air Monitoring Studies:**

> Nonsmokers who were exposed to smokers recorded significantly higher levels of RSP than did those who were not exposed. This was true for children with smoking parents (compared to children of nonsmokers), and for adults exposed to smoke both at home or at work.[33, 34]

COMMENT

1. **See: ITEM 2, COMMENT 5; ITEM 8, COMMENT 5; and ITEM 10, COMMENT 2.**

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